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THE USE OF THALLIUM ACETATE GLUCOSE BROTH IN THE DIAGNOSIS OF STREPTOCOCCAL MASTITIS

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The diagnosis of streptococcal mastitis by cultural methods involves, as a rule, the use of blood agar plates, the medium most commonly employed being the crystal violet, aesculin, blood agar of Edwards (1933).

The technique of such methods is expensive and time-consuming, and accordingly recent investigations have been carried out with a view to finding a fluid medium which would enable the diagnosis to be more readily made. Hartmann (1936) reviewed the selective action on streptococci of an extensive range of chemical substances and found that sodium azide yielded the best results. There is no record in his work, however, to show that he investigated the action of thallium salts. Edwards (1938) made practical use of Hartmann's conclusions and introduced a broth medium containing both sodium azide and crystal violet. Bryan, Devereux, Hirschey and Corbett (1939) employed a selective agent containing brilliant green (1 : 50,000), sodium azide (1 : 15,000) and glucose (1 : 1,000). They found that this medium suppressed the udder micrococci and extraneous bacterial contaminants and thus increased the accuracy of the microscopic and Hotis tests.

The present investigation was carried out to determine whether a thallium acetate broth might not be used for the diagnosis of streptococcal mastitis. The use of thallium acetate as a selective agent was suggested by the work of Browning and Gulbransen (1918). They found that this salt had a much greater inhibitory action on *Proteus* and allied organisms than on streptococci and staphylococci and consequently its addition to a peptone water agar medium facilitated the isolation of pyogenic streptococci from pathological specimens. Kinnear (1931) employed a broth containing thallium nitrate (6 : 10,000) and crystal violet (1 : 500,000). He found that although thallium nitrate retained its selective action in blood agar, its presence interfered with haemolysis.

The first experiment was designed to compare the value of thallium acetate with sodium azide as selective agents for the enrichment of streptococci in broth media.

Broth media were prepared, containing in the one case, 1 per cent. peptone, 0·5 per cent. glucose, 0·1 per cent. sodium chloride* and 0·1 per cent. thallium acetate, and in the other, 1 per cent. peptone, 0·5 per cent. glucose, 0·5 per cent. sodium chloride and 0·01 per cent. sodium azide. The glucose and thallium acetate or sodium azide were dissolved in water and added to the media just prior to sterilisation. The final *p*H value of the media was 6·8 but with part of the thallium acetate broth, 7·4. Sterilisation was carried out, as with all the media used in the following experiments, in the autoclave at 15 lb. pressure for 20 minutes.

The media were inoculated with pure cultures of various organisms, employing in each case one loopful of a 24-hour glucose broth culture as inoculum. The subcultures were then incubated for 48 hours at 37° C., the cultures being examined for evidence of growth at 24 hours and 48 hours.

The results of this experiment (Table I *over-leaf*) show that thallium acetate is a much more effective selective agent for the isolation of streptococci than sodium azide. Further, the H-ion concentration does not appear to affect this selective action as it does, according to Edwards (1938), in the case of sodium azide.

A further experiment was carried out to test the action of two other substances which have been suggested (Browning, 1918) as selective agents for the isolation of streptococci, *viz.*, potassium tellurite and telluric acid. Accordingly, media were prepared similar in composition to that of the sodium azide medium already described, the concentration of potassium tellurite and of telluric acid in each case being 1 : 500. As these substances were found to react with the other ingredients of the medium when sterilised together, the potassium tellurite and telluric solutions were sterilised separately and added to the sterilised medium, which was then tubed in sterile tubes. The final *p*H of the media was 6·8. Again, one loopful of inoculum was added from 24-hour glucose broth cultures of various organisms

* Preliminary work had shown that thallium acetate reacts with sodium chloride to form insoluble thallium chloride. This double decomposition is very marked when 0·5 per cent. sodium chloride is present in the medium and entirely removes the selective action of thallium acetate. This difficulty is overcome when only 0·1 per cent. of sodium chloride is added to the medium.

TABLE I

The effect of thallium acetate medium of pH 6·8 and 7·4 and sodium azide medium of pH 6·8 on the growth of various organisms (in pure culture)

Culture	Thallium acetate (1/1000) pH 6·8		Thallium acetate (1/1000) pH 7·4		Sodium azide (1/10,000) pH 6·8	
	24 hours	48 hours	24 hours	48 hours	24 hours	48 hours
B. subtilis	—	+(sl)	—	—	—	—
B. mycoides	—	—	—	—	—	—
Proteus vulgaris	—	+	—	+	+	+
Ps. aeruginosa	—	—	—	—	+	+
S. marcescens	—	—	—	—	—	—
E. coli	—	—	—	—	+	+
A. aerogenes	—	+(sl)	—	—	+	+
Staph. aureus	+	+	+	+	+	+
Mastitis streptococci						
S. agalactiae (Group 1) (1)	+	+	+	+	+	+
(2)	+	+	+	+	+	+
(3)	+	+	+	+	+	+
S. faecalis (isolated from water) (1)	+	+	+	+	+	+
(2)	+	+	+	+	+	+
(3)	+	+	+	+	+	+

— = growth absent.
+ = growth present.
+ (sl) = slight growth.

and the tubes were examined after 24 and 48 hours' incubation at 37° C. The results of this experiment are given in Table II. It will be seen that neither potassium tellurite nor telluric acid has a marked selective action for the organisms concerned. Accordingly, the use of these substances was not investigated further.

In the work of Browning and Gulbransen a peptone water agar medium containing thallium acetate was employed. Consequently, another experiment was carried out, using a glucose peptone agar medium to different batches of which varying concentrations of thallium acetate and thallium nitrate respectively were added. In another batch of the same medium sodium azide (1 : 10,000) was included. The final *p*H of all these media was 6·8. Once again the inoculum consisted of one loopful of a 24-hour broth culture and the agar slopes were examined after 24 and 48 hours' incubation at 37° C.

These results are given in Table III. It will be seen that the selective action of thallium nitrate is very similar to that of thallium acetate and, further, that a concentration of 1 : 500 of either of these salts may exert an inhibitory influence on *S. agalactiae*. The results obtained on the solid medium confirm to a great extent those recorded in the liquid broths.

TABLE II

The effect of potassium tellurite and telluric acid media on the growth of various organisms (in pure culture)

Culture	Potassium tellurite 1/500		Telluric acid 1/500	
	24 hours	48 hours	24 hours	48 hours
B. subtilis	+	+	+	+
B. mycoides	+	+	+	+
Proteus vulgaris	+	+	—	+
Ps. aeruginosa	+	+	—	+
S. marcescens	+	+	—	—
E. coli	—	—	—	—
A. aerogenes	+	+	+	+
Staph. aureus	+	+	+	+
S. agalactiae (Group I)				
Culture I	—	+	+	+
Culture II	—	+	+	+

— = growth absent.
+ = growth present.

TABLE III

The effect of thallium acetate, thallium nitrate and sodium azide in glucose peptone agar on the growth of various organisms

Culture	Thallium acetate agar				Thallium nitrate agar				Sodium azide agar	
	1/500		1/1000		1/500		1/1000		1/10,000	
	24 hours	48 hours	24 hours	48 hours	24 hours	48 hours	24 hours	48 hours	24 hours	48 hours
B. subtilis	—	—	—	—	—	—	—	—	12 colonies	+
B. mycoides	—	—	—	—	—	—	—	—	—	—
Proteus vulgaris	—	—	+	+	—	+	+	+	+	+
Ps. aeruginosa	—	—	—	—	—	—	—	—	1 colony	+
S. marcescens	—	—	—	—	—	—	—	—	—	—
E. coli	—	—	—	+(sl)	—	—	—	—	+(sl)	+
A. aerogenes	—	—	+(sl)	+	—	—	+	+	+	+
Staph. aureus	+	+	+	+	+	+	+	+	+	+
Streptococcal cultures										
S. agalactiae (Group I)—										
Culture A	—	+	+	+	—	—	+	+	+	+
„ B	+	+	+	+	—	—	+	+	+	+
S. lactis	+	+	+	+	+	+	+	+	+	+

— = growth absent.
+ = growth present.
+ (sl) = slight growth.
Colonies = restricted development of an organism which normally produces spreading growth.

In a further experiment an indicator (brom-cresol-purple) was incorporated with glucose peptone water containing in one case 1 : 1,000 thallium acetate and in another 1 : 10,000 sodium azide. The concentration of brom-cresol-purple was 1 : 400 and the final *p*H of both media was 6·8. The inoculations were made from 24-hour glucose broth cultures and the tubes were examined after 24 and 48 hours' incubation at 37° C. The results are recorded in Table IV. In view of the fact that several species of organisms, in addition to streptococci, were capable of producing acid in both media, no further experiments to test the acid-producing powers of organisms in such media were carried out.

TABLE IV

The effect on various organisms of thallium acetate and sodium azide in glucose peptone water + brom-cresol-purple

Culture		Thallium acetate 1/1000 + B.C.P.		Sodium azide 1/10,000 + B.C.P.	
		24 hours	48 hours	24 hours	48 hours
B. subtilis		—	—	—	—
B. mycoides		—	—	—	—
Proteus vulgaris		+ (sl A)	+ (sl A)	—	+ (sl A)
Ps. aeruginosa		—	—	+	+
S. marcescens		—	—	—	—
E. coli		—	—	—	—
A. aerogenes		—	+ (sl A)	—	+ (sl A)
Staph. aureus		+ (A)	+ (A)	—	+ (A)
Mastitis streptococci					
S. agalactiae, Group I	(1)	+ (A)	+ (A)	+ (A)	+ (A)
	(2)	+ (A)	+ (A)	+ (sl A)	+ (sl A)
	(3)	+ (A)	+ (A)	+ (A)	+ (A)
Faecal streptococci, isolated from water	(1)	+ (A)	+ (A)	+ (A)	+ (A)
	(2)	+ (A)	+ (A)	+ (A)	+ (A)

— = growth absent.
+ = growth present.
+ (sl) = slight growth.
A = acidity.

A comparison was then made of the multiplication rates of four organisms (*S. agalactiae*, *Proteus vulgaris*, *E. coli* and *Staph. aureus*) when grown for 24 hours at 37° C. in thallium acetate glucose broth. Control cultures were maintained concurrently in glucose broth without thallium acetate. Both the control broth and the thallium acetate broth were inoculated with 1 ml. of a saline suspension of each organism, the suspension being prepared from a 24-hour agar slope culture. The bacterial count per millilitre of the broths was estimated before and after incubation by plating out 1 ml. of varying dilutions, blood agar being used as the culture medium. The blood agar counts were carried out after 48 hours' incubation at 37° C. Only two experiments of this nature were performed and the results are recorded in Table V. Whilst definite conclusions cannot be reached on the basis of two experiments, it may be observed that the streptococci multiplied more rapidly in thallium acetate than any of the other organisms.

Table V

The relative rates of multiplication of various organisms in thallium acetate glucose broth and in a control broth (without thallium acetate) at 37° C. The rate of multiplication is expressed as the ratio of the bacterial count before incubation to the count after incubation

Experiment No.	Culture	Control Broth	Thallium acetate Broth	The ratio of the multiplication rate of the organism in the control broth to that in the thallium acetate
1	*S. agalactiae*	1 : 2,771,428	1 : 2,027,777	1 : 0·73
2	"	1 : 44,843	1 : 110,552	1 : 2·46
1	*Staph. aureus*	1 : 3,000,000	1 : 150,000	1 : 0·05
2	" "	1 : 781,818	1 : 66,666	1 : 0·08
1	*E. coli*	Uncountable after incubation	1 : 219,178	Unobtainable
2	"	1 : 12,941,175	1 : 537,142	1 : 0·04
1	*Proteus vulgaris* ...	Uncountable after incubation	1 : 261,728	Unobtainable
2	" " ...	1 : 1,188,405	1 : 265,625	1 : 0·22

The following conclusions may be drawn from the foregoing experiments :—

(1) Salts of thallium permit the development of most types of streptococci and exert an inhibitory influence on other organisms. This inhibitory action is more marked with Gram-negative rods than with Gram-positive cocci.

(2) The optimum strength of this selective action is a concentration of 1 : 1,000.

It was decided, therefore, to study the value of a medium containing thallium acetate in the diagnosis of streptococcal mastitis.

As has been stated already, the method most commonly employed in Britain for the diagnosis of streptococcal mastitis is plating out and incubating for 48 hours in a solid medium containing crystal violet, aesculin and ox blood. In addition to the disadvantages already mentioned, this method may not reveal lightly infected animals. Stableforth, Edwards and Minett (1935) dealt with this question and showed that more infected cows could be detected by a liquid crystal violet medium than in plates, but that many of the animals recovered. Other investigators have noted also that when the milk specimens are incubated prior to testing a greater number of cases of infection are found, and the view has been expressed that such light infections are the cause of the irregular results which are so frequently encountered in mastitis control work. Accordingly, recent investigations have been carried out to determine whether the diagnosis of streptococcal mastitis cannot be more readily and even more accurately made, using a broth medium containing a selective antiseptic.

In the technique introduced by Edwards (1938) for use with sodium azide broth, the inoculum consisted of a loopful of cream. This obviates the use of centrifuge tubes and the necessity for centrifugalisation. Further, Hignett (1940) has compared cream, whole milk and sediment, as inocula in mastitis diagnosis. His results indicated that a greater number of positives could be detected when cream is used. This method was adopted, therefore, in the present work.

The first medium employed had the following composition : Lab. Lemco, 1 per cent. ; peptone (Allen and Hanbury's), 1 per cent. ; sodium chloride, 0·1 per cent. ; glucose, 0·5 per cent. ; thallium acetate, 0·1 per cent. The medium was prepared in the manner already described, and put up in 5 to 6 ml. quantities in tubes measuring 5 in. × ½ in. The final *p*H, after sterilisation, was 6·8.

In drawing the sample the first stream of fore-milk was rejected into a strip-cup and examined. The sample, consisting of more fore-milk, was then drawn into a sterile milk tube stoppered with a rubber bung. The tubes were transferred to the laboratory and stored overnight in an ice-chest. The following morning one loopful of cream from each tube was inoculated into the thallium acetate broth. At first, a single loop, approximately 3 mm. in diameter, was used. The inoculation was done carefully, the loop being inserted just below the surface of the medium and the cream allowed to slide off, so that only slight turbidity was created in the broth. The tubes were placed in racks and incubated at 37° C. and examined after 24 and 48 hours' incubation. The growth characters could be classified arbitrarily into the following three types :—

(*a*) A turbidity which was more or less uniform in character and no sediment ; (*b*) a silt-like deposit, the supernatant fluid being either clear or turbid ; (*c*) a heavy flocculent deposit, the supernatant fluid being clear, turbid or more frequently showing small granular masses of growth in suspension. Microscopic examination of the foregoing three types of

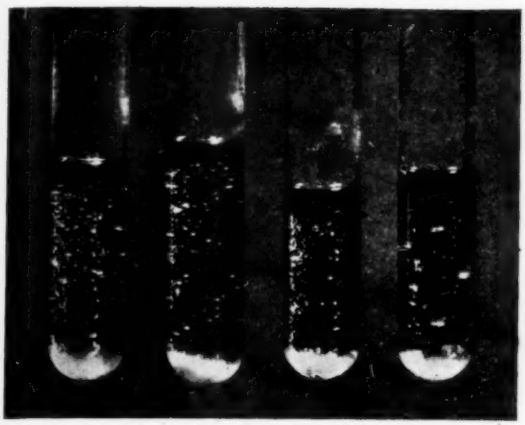

PLATE I.—The growth characters of *S. agalactiae* after 48 hours' incubation at 37° C.

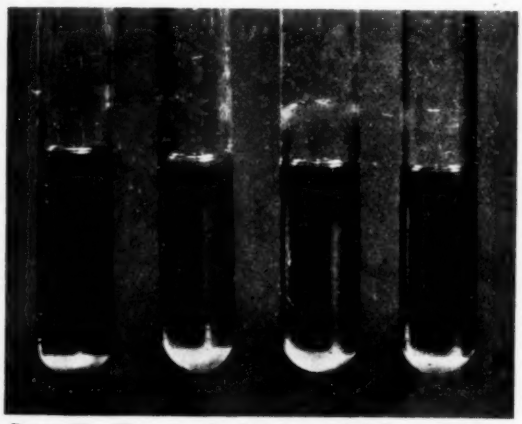

PLATE II.—The growth characters of (left to right) a "viridans" type streptococcus, *S. faecalis*, *S. bovis* and *S. lactis* after 48 hours' incubation at 37° C.

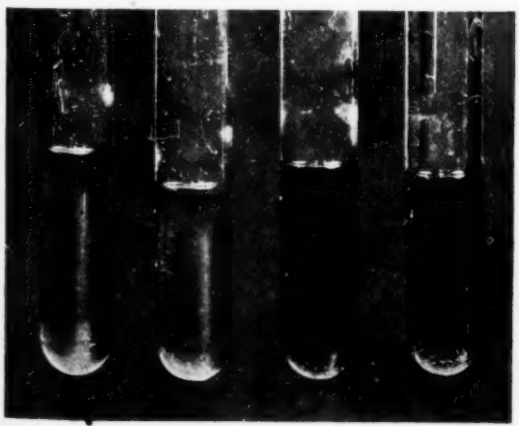

PLATE III.—The appearance of (left to right) *Proteus vulgaris*, *A. aerogenes*, *E. coli* and *Staphylococcus aureus* after 48 hours' incubation at 37° C.

Plates I to III show the growth characters of pure cultures of various organisms in thallium acetate, glucose, crystal violet (1 : 2,000,000) broth. These plates show clearly the various appearances which may be observed in the medium, *viz.*, the thick flocculent deposit of *S. agalactiae* (Plate I), the fine, silt-like deposit of short-chain streptococci (Plate II), and the slight uniform turbidity or negative result (Plate III). This turbidity is shown by *Proteus vulgaris* and occasionally by *A. aerogenes*. The tubes of *E. coli* and *Staphylococcus aureus* are negative.

I am indebted to Mr. J. Manby for these plates.

growth showed that typical long-chain mastitis streptococci occurred only in the flocculent deposits of (*c*). (This appearance in liquid culture is generally recognised as typical of streptococci occurring in long chains.) Accordingly, only tubes showing such growth characters were recorded as positive.

In Table VI (*over-leaf*) are shown the results of a series of tests on 608 quarter samples of milk cultivated in thallium acetate broth, Edwards' sodium azide broth and Edwards' blood agar medium. As the last is the medium most commonly employed in Britain, the results in this medium have been taken as the standard against which the value of the other media may be compared. (The same procedure was adopted in the later investigations reported in this article.) Since it is generally recognised that Edwards' agar misses a variable proportion of cases of infection, the figures of "known" positives in Table VI are compiled from samples positive in one, two or all media. This method was employed by Stirling (1940). The figures of "true" positives under the thallium acetate and sodium azide broths indicate the number and percentage of samples where the result in the broths was confirmed by subsequent plating out of the deposit in Edwards' agar.

It will be seen from Table VI that 98 "known" positives were recorded; of these, 73 (74·5 per cent.) were positive by Edwards' agar method; 92 (93·9 per cent.) by thallium acetate broth and 41 (41·8 per cent.) by sodium azide broth. It may be observed that a large number of positives occurred in thallium acetate broth. Microscopic examination showed that the false positives were probably due to the growth of commensal micrococci from the udder in the thallium acetate broth. Consequently, a further experiment was made to compare the action of the thallium acetate glucose broth with a thallium acetate glucose broth containing crystal violet in a concentration of 1 : 1,000,000. In this investigation 320 quarter samples of fore-milk were examined, the samples being drawn into sterile tubes and stored overnight in an ice-chest. The inoculum consisted of one loopful of gravity cream. The samples were also tested by plating in Edwards' agar. The results are shown in Table VII (*over-leaf*). In this series there were 87 "known" positives of which 58 (66·7 per cent.) were positive in Edwards' agar, 78 (89·7 per cent.) in thallium acetate broth and 57 (65·5 per cent.) in thallium acetate, glucose, crystal violet broth.

It would appear that crystal violet in a concentration of 1 : 1,000,000 has a marked inhibitory action on streptococci. Accordingly, another batch of medium was prepared containing only 1 : 2,000,000 crystal violet. A total of 984 quarter samples was tested in this medium using the same procedure as

TABLE VI

The diagnosis of streptococcal mastitis using (a) *crystal violet, aesculin, blood agar (Edwards' medium),* (b) *thallium acetate, glucose broth, and* (c) *sodium azide, crystal violet broth*

Number of samples	"Known" positives	(*a*) Positive by Edwards' agar	(*b*) Thallium acetate broth		(*c*) Sodium azide broth	
			Total positives	"True" positives	Total positives	"True" positives
608	98	73 (74·5 per cent.)	225	92 (93·9 per cent.)	103	41 (41·8 per cent.)

TABLE VII

The diagnosis of streptococcal mastitis using (a) *crystal violet, aesculin, blood agar (Edwards' medium),* (b) *thallium acetate, glucose broth, and* (c) *thallium acetate, glucose, crystal violet* (1 : 1,000,000) *broth*

Number of samples	"Known" positives	(*a*) Positive by Edwards' agar	(*b*) Thallium acetate broth		(*c*) Thallium acetate, crystal violet (1 : 1,000,000) broth	
			Total positives	"True" positives	Total positives	"True" positives
320	87	58 (66·7 per cent.)	121	78 (89·7 per cent.)	62	57 (65·5 per cent.)

before. However, the platinum wire, employed for inoculating the medium with cream, was coiled into a triple loop, each coil being 3 mm. in diameter, and the distance between each coil being 1 mm. The samples were also tested in Edwards' agar. In this experiment the deposit in the thallium acetate broth was recorded as positive only if subsequent microscopic examination revealed the presence of streptococci. This procedure seemed justified in view of the fact that, in many instances, the colonies in Edwards' agar were only recorded as positive by confirmatory tests. The results, recorded in Table VIII, show that there were 88 "known" positives; of these, 59 (67 per cent.) were positive in Edwards' agar and 54 (61·4 per cent.) in thallium acetate, crystal violet broth. There was, therefore, a fair measure of agreement between the two methods and, moreover, there was a marked reduction in the number of false positive deposits in the thallium acetate, crystal violet (1 : 2,000,000) broth.

In view of these results it was decided to investigate the value of this thallium acetate, crystal violet medium in the examination of composite quarter samples from individual cows. Accordingly, a series of bulk samples was obtained from 169 cows belonging to six different herds. These samples consisted of two streams of fore-milk from each teat drawn into a sterile test-tube, which was then stoppered with a sterile rubber bung. (A strip-cup examination of each cow was made previously and any abnormal condition of the fore-milk was noted.) The tubes were stored overnight in an ice-chest and the following morning a loopful of gravity cream was inoculated into the thallium acetate, crystal violet, glucose broth, using the triple loop mentioned above. The inoculated broth was incubated 48 hours at 37° C. At the same time centrifuge deposits from the milk specimens were plated on Edwards' blood agar. After the incubation period the broth cultures were examined and those tubes noted which showed a heavy flocculent deposit. A portion of this deposit was withdrawn by a Pasteur pipette. This was done by inserting the tip of the pipette into the deposit in the bottom of the tube, keeping the upper end closed by the forefinger; when the finger was released a small portion of broth and deposit was forced into the pipette. One drop was transferred to a sterile Petri dish containing 0·5 ml. sterile saline. The plate was then poured with ordinary blood agar and incubated 24 hours at 37° C. At the same time

TABLE VIII

The diagnosis of streptococcal mastitis in quarter milk samples using (a) *crystal violet, aesculin, blood agar (Edwards' medium), and* (b) *thallium acetate, glucose crystal violet* (1 : 2,000,000) *broth*

Number of samples	"Known" positives	(*a*) Positive by Edwards' agar	(*b*) Thallium acetate, crystal violet (1 : 2,000,000) broth	
			Total positives	"True" positives
984	88	59 (67·0 per cent.)	114	54 (61·4 per cent.)

TABLE IX

The diagnosis of streptococcal mastitis in individual bulk milk samples using (a) *crystal violet, aesculin blood agar (Edwards' medium), and* (b) *thallium acetate, glucose, crystal violet* (1 : 2,000,000) *broth*

Number of samples	"Known" positives	(a) Positive by Edwards' agar	(b) Thallium acetate, crystal violet (1 : 2,000,000) broth	
			Total positives	"True" positives
169	33	26 (78·8 per cent.)	40	32 (97·0 per cent.)

TABLE X

The number of positive results in thallium acetate, crystal violet, glucose broth, after 24, 48, and 72 hours' incubation

Number of samples	Positive in thallium acetate broth after incubation for :		
	24 hours	48 hours	72 hours
169	16	40 (32)	51 (34)

The number of "True" positives is indicated in parenthesis.

a smear was made from the deposit on the tip of the pipette. The smears were stained with Loeffler's methylene blue and examined microscopically. As a rule only streptococci were present, but in some instances clusters of large cocci. Where only the latter could be seen the result was recorded as probably negative. On the following day the microscopic examination was confirmed by the growth in the blood agar plate prepared from the deposit.

The result of this investigation is recorded in Table IX. It will be seen from the table that there were 33 "known" positives; of these, 26 (78·8 per cent.) were positive in Edwards' agar and 32 (97 per cent.) in thallium acetate broth. These results confirm the satisfactory results obtained with this thallium acetate medium in the previous experiments.

It was noted that in the microscopic examinations carried out in these investigations, many of the organisms appeared involuted. It was suspected, therefore, that the occasional failure of the broth to show growth when transferred to the blood agar plate, was due to the organisms being in an enfeebled condition in the broth culture.

In Table X are shown the number of positive tubes of thallium acetate observed in the previous investigation after 24, 48 and 72 hours' incubation. It will be seen from the table that eleven more positives resulted from the further period of incubation, but only two of these were "true" positives on subsequent examination. It was concluded, therefore, that an additional 24 hours' incubation is unnecessary, except where the sample is suspected by reason of the clinical or strip-cup examinations. With regard to the other positive tubes of thallium acetate broth, recorded in this series, these, in 15 instances, produced either green, viridans type, colonies on blood agar, or were non-haemolytic types which, microscopically, were either micrococci or short-chain streptococci. It was noted that the largest number of the viridans type were found in samples from two farms where the udders and flanks of the animals were badly contaminated with excrement and mud, and it was difficult to obtain samples free from external contamination. It is therefore essential, in carrying out such cultural tests, that the udders and teats of the animals are cleaned thoroughly before drawing the samples.

Composition and Use of the Recommended Medium

In view of the foregoing results, it is suggested that the following medium and technique be adopted in mastitis control work.

Composition of medium :—

Lab. Lemco	1 per cent.
Peptone	1 per cent.
Sodium chloride ...	0·1 per cent.
Glucose	0·5 per cent.
Thallium acetate ...	0·1 per cent.
Crystal violet	0·00005 per cent.
Final *p*H	6·8

The broth is prepared in the usual manner and the reaction is adjusted and the medium filtered. Then glucose and thallium acetate each dissolved in a few millilitres of water, are added and also the crystal violet solution (0·5 ml. of a 0·1 per cent. solution of crystal violet per litre). The medium is tubed in approximately 5 to 6 ml. quantities in tubes measuring 5 in. × ½ in. and sterilised at 15 lb. pressure for 20 minutes. (The peptone used in these investigations was Eupeptone, supplied by Messrs. Allen & Hanbury, or Bacteriological Peptone obtained from Messrs. Evans.)

The method which is now being employed in this department in the collection and testing of samples is as follows :—

1. The udders and teats of the animals are cleaned thoroughly, using water containing a disinfectant, *e.g.*, hypochlorite.

2. The first stream of fore-milk from each teat is drawn into a strip-cup and any abnormal appearance noted.

3. Two streams from each teat are then drawn into a sterile test-tube (6 in. × ½ in.) which is then stoppered with a rubber bung.

4. The samples are stored overnight in a refrigerator or ice-chest.

5. The following morning one loopful of gravity cream from each sample is inoculated into the thallium acetate broth, using a triple loop. At the same time any further abnormal appearance of the milk is noted.

6. The thallium broth cultures are incubated for 48 hours at 37° C.

7. After incubation the tubes are read and microscopic examination of the deposit in the positive tubes is carried out. At the same time one drop of the deposit which has been withdrawn by a Pasteur pipette is transferred to 0·5 ml. saline in a Petri dish and a blood agar plate is prepared.

8. The blood agar plates are incubated for 24 hours at 37° C. and then examined.

9. The record sheet is drawn up as follows :—

Sample No.	Appearance of Fore-milk.	Thallium Acetate Broth.	Microscopic Examination.	Blood Agar.	Final Result.

While this technique requires an additional day's incubation as compared with the present practice, it is much less laborious. Thus it was found that the cream from approximately 80 samples could be inoculated into the thallium acetate broth in 30 minutes. Moreover, there is a considerable saving in materials, including glassware, since the number of samples which require to be plated is, as a rule, small.

It should be noted that if a specimen of milk is grossly changed in character it should not only be inoculated into thallium acetate broth, but also plated out directly in plain blood agar. Thus cases of corynebacterial and staphylococcal mastitis are not overlooked.

Summary

The selective action of thallium acetate on pure cultures of various organisms is described and a comparison is made with sodium azide, potassium tellurite, telluric acid and thallium nitrate. This action is further investigated in the diagnosis of streptococcal mastitis in quarter and individual bulk milk samples. A medium containing thallium acetate, glucose and crystal violet, is recommended for such work and a simple and rapid technique is described.

Acknowledgments

The author desires to acknowledge the help and criticism received from his colleagues, Mr. S. L. Hignett and Mr. R. W. Roach.

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"ADULTERATION OF MILK INCREASING"

An increasing amount of adulteration of milk, judging from samples taken, is causing concern to the Weights and Measures Committee of Cheshire Country Council.

The committee has given special consideration to a report of the county analyst which stated that one in seven of the samples examined by him last quarter contained some adulteration.

"In carrying out one's duty," the analyst states, "it is becoming necessary to express results in bulk terms in order that the increasing and reprehensible practice of dilution should be more thoroughly appreciated by the layman. It is a matter for grave concern and calls for constant vigilance throughout the country, since, quite apart from illicit profits, there is the necessity these days particularly of maintaining the good and wholesome quality of milk."

The committee recommended that the attention of the Ministry of Health be drawn to the increase in adulteration of milk with a view to their requesting the Secretary of State specially to draw the attention of J.P.s to the importance of imposing heavy penalities when convicting sellers of adulterated milk. They also expressed the opinion that magistrates should be empowered to revoke licences for accredited milk if they considered such a course necessary when convicting sellers of adulterated milk.—*Farmers' Weekly.*

A NATIONAL HORSE FOOD

The Minister of Food has made an Order, now in force, to modify the composition of National Pig and Cattle Foods and to permit the production of a National Horse Food and of a new National Poultry Corn.

As the end of the season approaches, oats and other grains are naturally in somewhat short supply, and it has been considered advisable to reserve supplies of oats for oatmeal milling and horse feed only. In the circumstances, some manufacturers are experiencing difficulty in preparing certain compound and mixed feeding-stuffs to the specifications laid down in the present Order. Consequently, the amending Order: (*a*) Modifies the composition of National Pig Foods, Nos. 1 and 2, and (*b*) permits the production of a National Poultry Corn No. 3.

The Order also provides for the production of a compound horse nut, called National Horse Food No. 1.

Finally, the new Order increases the permitted albuminoid content of National Cattle Food No. 1 from 19½ per cent. minimum, 21 per cent. maximum, to 21½ per cent. minimum, 23 per cent. maximum, and also requires the use in National Cattle Foods Nos. 1, 2 and 3, of a minimum of 2½ per cent. of meat meal and/or meat and bone meal, which are in relatively good supply.

The use of these animal proteins will conserve supplies of vegetable protein.

CLINICAL COMMUNICATION

An Unusual Finding on Post-Mortem Examination of a Colic Case

C. B. DAVIDSON, M.R.C.V.S.,
DALKEITH

Subject.—A Clydesdale gelding, about 12 years old.

History.—This animal had an attack of colic at about 4 p.m. one afternoon, evidenced by crouching in quickly repeated spasms, a little sweating and looking round at the flanks. A half-dose (about 3 oz.) of a proprietary medicine was given which the label stated contained 16·6 per cent. chloral hydrate. The animal was thereafter kept on its feet by the owner and in a short while the pain disappeared.

There was a recurrence of the pain about 9 p.m. The horse was then given a full dose of the same proprietary medicine and veterinary assistance was sought.

Symptoms.—There was evidence of pain of an acute nature: considerable crouching, some patchy sweating, looking round—principally to the left flank—and hurried respirations.

The temperature, though not a guide to any diagnosis in cases of colic, was taken and found to be 100° F. This was done because of the suspicion that some of the medicine given might have entered the trachea. The pulse was 64 and of fairly normal capacity; the respirations were about twice the normal. The membranes were injected. Borborygmi were present in all sections of the bowel. Rectal examination was negative.

Diagnosis.—Tentatively, impaction of the stomach was diagnosed.

Treatment.—The stomach tube was passed and some gas escaped, but there were no symptoms of tympany of the stomach present. A mixture of oleum terebinth., spts. aether nit., and ammonia was given in water by the tube. The horse was placed in a box and immediately lay down. Time was given to allow the stimulants to act but at the end of half an hour a dose of chloral hydrate had to be administered. More chloral was left with the owner, who was told to telephone if the horse got worse. On the following morning I was informed that the animal was dead.

Post-mortem Examination.—The skin and fore limbs had been removed previous to my arrival at the knackery. It was noticed right away that a portion of the right lung was protruding from between two ribs, but this was passed over, it being thought that the knackerman was responsible.

In the abdomen the ventral portions of the large colon may have been a little drier than normal, but otherwise the viscera were normal.

The pleural cavity was now emptied and the remarkable fact that there existed a complete fracture of the vertebral column was discovered. This, on closer examination, was found to be between the fifth and sixth thoracic vertebrae and also to involve the heads of the fifth ribs, especially that on the right side. There was a considerable amount of extravasated blood around the fracture, showing that this occurred some time before death.

No evidence of the horse throwing himself down violently could be got from the owner; the animal, however, was alive at 1.30 a.m. and seemed to be free from pain at the time, and was standing. At 4 a.m. the owner found him dead.

ANNOTATION

LACTATION

The problems of mammary physiology are of outstanding importance to the veterinarian, and it is well that, within the last 10 or 15 years, progress in this field has been greatly accelerated. With the accumulation of information on the endocrinological relationships of the gland, the nervous mechanisms involved in its functioning and, perhaps of even greater importance, the biochemical changes in the gland itself, the physiology of lactation is rapidly coming abreast of those older established branches of the subject which form the bulk of most textbooks on physiology.

Endocrinological Mechanisms and Lactation

A recent review (Folley 1940)[1] well illustrates the complex nature of the endocrine relationships of the mammary gland. Almost no evidence has been brought forward on this subject without some contradictory findings later appearing in the literature, and the complete elucidation of each aspect is won only after much critical work. The fact that the hypophysis is involved in several distinct ways is responsible for not a little of this confusion; thus the part played by the pituitary in the growth of the gland produced by the injection of oestrogens cannot be conclusively settled by experiments on hypophysectomised animals, since the general lowered metabolic rate of such creatures could, in itself, interfere with its growth. Nevertheless, it seems likely that a "mammogenic" hormone can be added to the already long list of pituitary factors. The production of the substance is stimulated by the injection of oestrogens and some androgens, and appears to play its part in the normal development of the gland.

The history of prolactin gives an insight into another difficulty of the worker in this field. Contradictory reports on the properties of crude prolactin show the necessity of further purification of the pituitary hormones. Reports of the isolation of a crystalline prolactin have been published, but confirmation is needed, and certainly, no large scale experiments have been made with the product. Folley and Young[2], in an outstanding series of experiments on dairy cows, have studied the properties of prolactin preparations. Single injections produced a temporary increase in the milk yields of cows in declining lactation. There was a greater correlation between the glycotropic (blood sugar raising) factor in these extracts and the lactogenic power, than between the latter and the prolactin content estimated as power to stimulate the crop gland of the pigeon. It is therefore likely that factors other than prolactin in the narrow sense are responsible for the lactogenic effects of these pituitary preparations. Prolonged treatment maintained the raised level of milk production; but the continuance of the injections did not prevent the normal decline towards the close of lactation. Repeated large doses soon after calving raised the milk yield throughout the lactation, and it

is suggested that enhanced growth of the gland had been produced, perhaps by the "mammogenic" factor referred to above.

The adrenals and the thyroid also play a part in the maintenance of milk secretion, perhaps indirectly through their effect on general metabolism. Administration of thyroxine to dairy cattle results in an increase in yield, with a rise in milk fat and solids non-fat, particularly lactose. This effect can be established best in cows in declining lactation. Again the fall in yield towards the end takes place normally in spite of continued treatment. Alterations in milk composition can also be produced by the administration of oestrogens which have been found to increase both fat and solids non-fat. This increase persists for some considerable time. Larger doses cause inhibition of secretion. Experiments with the synthetic oestrogen, diethylstiboestrol, gave similar results (Folley, Scott Watson, Bottomley 1941)[3], and these workers have also made preliminary studies on the important problem of the threshold of oestrogen which will not have an injurious effect on the reproductive system while producing the desired improvement in milk production.

Nerve Relationships of the Mammary Gland

While there are no true secretory nerves to the mammary gland it must be borne in mind that milk secretion might be controlled by the vasomotor nerves of the rich vascular network of the gland. Of the two other aspects, one has been dealt with comprehensively by Hammond (1936)[4] in his suggestion of a nervous mechanism producing the "letting down" of milk. In brief, this is believed to be due to a spinal reflex, the afferent path being the sensory nerves from the teat, and the efferent nerves to smooth muscle associated with the veins of the udder; so that there is engorgement of the vascular bed of the udder when milking commences, causing pressure of the blood vessels on the milk alveoli and smaller ducts of the gland, expressing milk into the larger channels. The other nervous mechanism has been most fully studied by Selye and his co-workers.[5] This is the suckling stimulus to gland function, best demonstrated by the development of the gland brought about in non-pregnant animals by the provision of suckling litters. The afferent path of this reflex is by the sensory nerves of the teats, and the efferent path is hormonal in nature, probably the mammogenic factor of the pituitary.

Biochemistry of Mammary Function

The technique for obtaining arterial blood from the internal iliac described by Graham, Kay and McIntosh (1936)[6] makes it possible to obtain approximately simultaneous samples of the arterial blood supplied to the udder and the venous blood leaving it. Deductions on the precursors in the blood of the constituents of the milk are therefore placed on a sounder basis than formerly. The mammary balance sheet is still incomplete, however, since the lymphatic drainage of the gland is not accounted for. The rate of blood flow through the gland, and the proportion of metabolites withdrawn from the blood and used for the energy requirements, also introduce unknown variables.

Some theoretical estimations of the rate of blood flow through the gland have been made by assuming that all the lactose in the milk is derived from the glucose of the blood. The values found have been higher than those found by Graham in the few direct measurements made by thermostromuhr, and this fact, with added evidence from metabolism of tissue slices, suggests that some of the milk sugar is derived from the blood lactic acid. Once more the estimation of the energy requirements of the gland is a stumbling block in determining the use of the blood sugar absorbed. Nevertheless, there is a correlation between blood sugar and the lactose in the milk, a high blood sugar in, for example, hyperthyroidism, being associated with an increase of the lactose content of the milk.

Although the milk fats are of a unique composition, the majority of the evidence suggests that they are derived by chemical transformation of the fatty acids of the blood neutral fats. There is no good evidence that they are derived from the blood phospholipins.

The source of caseinogen might be the amino-acids and the inorganic phosphates of the blood, or the blood proteins by way of fairly complex breakdown products. Graham, in studying the nitrogen balance, found that the amino nitrogen uptake was insufficient to account for the caseinogen, and it would appear that the globulin fraction of the blood protein is an important source of milk protein. The phosphorus of caseinogen appears to come from the inorganic phosphates of the blood.

Little experimental work has been carried out on the enzyme systems of the mammary gland, and it is from this field that information on the mechanism of synthesis of milk constituents is most likely to be obtained to supplement the data from balance experiments. Only in the case of phosphatase has a detailed study been made. This enzyme appears to arise within the gland cells (it is not derived from blood phosphatase) and changes in secretory function are usually accompanied by striking changes in the amount of enzyme excreted in the milk.

An attempted clarification of the situation, as it now appears to be, is given in the following summary.

Mammary Gland

Endocrinological Mechanisms

1. Growth

(*a*) *Oestrogens* stimulate growth. Probably an indirect mechanism by way of the pituitary.

(*b*) *Progesterone* may be involved with oestrogens in their effects. Final evidence lacking.

(*c*) *Androgens*, depending on their chemical structure, may or may not resemble oestrogens.

(*d*) *Pituitary* Extracts will stimulate growth. A specific "mammogenic" factor or complex is a likely explanation.

That general metabolic state is normal is an essential corollary of these effects. This involves the presence of, notably, adrenal cortical hormone and it is impossible to define sharply the sphere of influence of the hormone involved.

2. Secretion

(1) *Direct effects.* "Prolactin" preparations have a stimulating action on secretion. It is possible that the lactogenic effect is spread over several agents in such preparations, some of which may be more or less indirect, acting on general metabolism and blood sugar.

(2) *Indirect effects*

(*a*) *Thyroxine.* Influences supply of milk precursors to the gland and so milk composition and yield. Rise of milk fat and solids non-fat, especially lactose.

ABSTRACTS

[STUDIES ON BOVINE MASTITIS. Bull, L. B., Murnane, D., Munch-Petersen, E., MacLean, J. D., and Clark, S. E. R. (1940.) *Bull. Coun. Sci. and Indus. Res. Aust.*, No. 134. (1940.) 107 pp.]

Non-pregnant heifers were purchased and placed on a clean farm, and in this way a herd of 30 animals was established. This report deals with the first two lactation periods. During the first week following calving, quarter samples of milk were examined daily and during the subsequent lactation fortnightly examinations were made; the herd was also kept under careful clinical observation. It was hoped that a study of the herd as a whole would give a wide and sound basis on which to build an investigation into those bacterial diseases of the udder grouped under the broad term of bovine mastitis.

No member of the herd could have had contact with a case of mastitis at least after calfhood and *Str. agalactiae* was not introduced in an udder that had ever functioned, but it was obtained from 16 quarters during the first week of lactation, and was obtained on one or more occasions from all but three of the 30 cows by the end of the second lactation. Most of the infections were, however, transient and non-clinical.

The results indicate that *Str. agalactiae* can be so intimately an environmental bacterium of the dairy cow that there may be great difficulty in selecting from existing dairy herds virgin heifers which are not carriers of the streptococcus. The view that *Str. agalactiae* produces a disease which is highly contagious, and that the other streptococci, the micrococci and the haemolytic staphylococci do not, receives no support from these results. All these micro-organisms appear to be commensals or parasites in turn, the actual relationship possibly depending more on the qualities of the host than on those of the bacterium. The micrococcus is, however, almost non-pathogenic and in this study the staphylococcus has been more pathogenic than *Str. agalactiae*. The micrococcus has been the most infective, the staphylococcus next and *Str. agalactiae* the least infective. The results do not suggest that mastitis due to the last-named organism can be entirely eliminated from a herd by the eradication of animals found to harbour the steptococcus in the udder. The success obtained by this method possibly depends in large part on the removal of susceptible animals rather than solely on the removal of the reservoir of infection.

Str. agalactiae was isolated from the faeces of seven cows and from sores on the teats of two. There was no positive correlation between the size of the teat orifice or the milk yield and the incidence of mastitis. Varicose lesions of the lining membrane of the teats were common and appeared to be non-bacterial in nature.

Taken as a whole, the results are somewhat unexpected and may be in part due to the youth of the cows or the lack of an epidemic strain of *Str. agalactiae*. The authors quite rightly state that generalisations should not be too freely made. In this country it is generally accepted that chronic mastitis can be controlled if not eliminated by " the usual methods."

J. F.

[This important work, it is suggested, might be read in conjunction with the review printed in the July 12th issue of this journal on the subject of the pathogenesis of bovine mastitis.—*Editor.*]

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[VACCINATION TO CONTROL BRUCELLOSIS IN CATTLE. Haring, C. M., and Traum, J. (1941.) *J. Amer. vet. med. Ass.* **98**. 278.]

Br. abortus strain 19, prepared by the U.S. Bureau of Animal Industry, has been used extensively in America for the past six years in vaccinating cattle against Bang's disease. The authors now summarise the data accumulated, particularly those obtained at the California Station. The most significant feature is that a high degree of protection is afforded by this strain and that 94 per cent. of cattle in infected herds produce full-time calves. This figure is slightly higher than the percentage in herds freed from brucellosis as the result of applying the agglutination test.

Tests for agglutinins in the blood are desirable not only at the time of vaccination but also between three and six weeks afterwards in order to measure the antigenic potency of the vaccine. The length of time agglutinins will persist after vaccination depends on three factors: (*a*) the age at vaccination; (*b*) whether or not the animal is subsequently exposed to Brucella infection; and (*c*) the relative proportion of Rough (R) and Smooth (S) types of organisms in the vaccine used. It may be anticipated that over 95 per cent. of calves vaccinated before eight months of age will be negative before their first calving. In view of the fact that the vaccine now being issued may contain variable numbers of these variants, the author still considers vaccination with strain 19 to be in the experimental stage.

S. J. E.

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[FIELD EXPERIMENTS ON BANG'S VACCINATION. Rabsten, M., and Welsh, M. (1941.) *J. Amer. vet. med. Ass.* **98**. 268.]

A concise summary is given of experiments conducted on the vaccination of cattle against Bang's disease. The present report deals with the results of vaccinating 796 young animals belonging to eleven infected herds with U.S.A. Bureau of Animal Industry, Strain 19; of these, 642 were vaccinated between 3 to 8 months of age (Group 1), 89 between 9 and 12 months (Group 2), and 65 between 13 and 21 months of age (Group 3). All the animals developed

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(*b*) *Adrenal cortical hormone.* Influences milk production by its general effect.

(*c*) *Oestrogens.* In small doses, these alter the composition of the milk, raising the total solids. Larger doses produce inhibition of secretion. The mechanism of these effects is not known.

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[3]———, Scott-Watson, H. M., and Bottomley, A. C. (1941.) *J. Dairy Research.* **12**. 1.

[4]Hammond, J. (1936.) *Vet. Rec.* **16**. 519.

[5]Selye, H., and McKeown, T. (1934.) *Anat. Rec.* **60**. 323.

[6]Graham, W. R., Kay, H. D., and McIntosh. (1936.) *Proc. Roy. Soc. B.* **120**. 319.

J. B. Brooksby.

an agglutination titre of 1 : 200 within two weeks. There was a direct relationship between the age of the animal at the time of vaccination and the length of time that a positive blood reaction was retained. Nine months following vaccination 91 per cent. of Group 1, 50 per cent. of Group 2, and 20 per cent. of Group 3 were negative to the agglutination test.

Out of a total of 640 pregnancies in vaccinated animals, ten, or 1·5 per cent., terminated in abortion of which five were due to *Br. abortus*. Three of the eleven herds are now completely negative, having replaced their reactors with home bred, vaccinated animals. Quarter milk samples from 77 vaccinated animals have been examined for the presence of *Br. abortus* and in no instance has strain 19 been isolated.

S. J. E.

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[EFFECT OF FEEDING REPEATED SMALL DOSES OF SELENIUM AS SODIUM SELENITE TO EQUINES. Miller, W. T., and Williams, K. T. (1940.) *J. Agric. Res.* **61**. 353.]

This article reports the results of feeding repeated small doses of selenium in inorganic form to three horses and a mule over periods up to a year and a half. At the beginning of the experiment two horses and a mule were used and sodium selenite was added to their oats at the rate of 24 parts per million of the total ration. After two months, however, they refused to eat the selenised oats and the method of administration was changed to drenching after feeds. Four months later the dose was doubled and after about a fortnight the mule died. Following four months' further drenching, the method of administration had again to be changed, as the horses refused to swallow the solution, and sodium selenite in very dilute solution was sprinkled on both oats and hay. The level of selenium feeding was raised to 96 parts per million of the feed about 15 months after the experiment began and the horses died about two to two and a half months later. A third horse, which was given approximately 115 parts of selenium daily for every million parts of food, lived only five weeks.

There would thus appear to be little doubt that chronic poisoning can be induced in equines when repeated small doses of selenium are fed in the form of sodium selenite, the minimum lethal dose for horses being about 1·5 mg. per pound body weight. The chief symptoms recorded were emaciation, in spite of a fairly good appetite, and drowsiness. In the two horses fed for the longest period slight softening and scaling occurred in the horny wall of the hoof. In addition, the long hair of the mane and tail became loose, but extreme depilation of these parts or sloughing of the outer wall of the hoof was never observed. Thus none of the symptoms were so outstanding as those described in cases of animals maintained on naturally selenised feed (alkali disease). The lesions observed at autopsy, *viz.*, hepatic cirrhosis and petechial haemorrhages in heart, spleen and kidneys, were somewhat similar to those reported in natural cases of the disease.

A. R.

Weekly Wisdom

The greatest and noblest pleasure which men can have in this world is to discover new truths; and the next is to shake off old prejudices.—Frederick the Great.

IN PARLIAMENT

Pharmacy and Medicines Bill

The Pharmacy and Medicines Bill was considered in committee by the House of Lords on August 5th.

On the motion to go into committee, the Lord Chancellor said that since the second reading debate Lord Plumer and others had attended conferences with the Government, as a result of which most of the difficulties in regard to herbalists had been removed. Amendments would be moved on behalf of the Government which he hoped would fairly meet the difficulties. The Government were glad to make the language clearer and thus to relieve the apprehensions of the herbalists.

The Lord Chancellor moved a series of amendments to Clause 1, dealing with poisons, after a careful revision of the clause by the Home Office. The amendments were agreed to.

On Clause 8 (Disclosure of composition of medicines), the Lord Chancellor said the anxiety of the herbalists had been that they were required to state the chemical constituents in the bottles, notwithstanding that there might be serious chemical changes after the contents had been put together. That would be too severe a burden on the herbalist, so he proposed to amend the clause by requiring that the label should state in regard to the substance "each of the active constituents thereof, or of each of the ingredients of which it has been compounded."

The amendment, and consequential alterations, were agreed to.

Lord Balfour of Burleigh expressed regret that medicines for horses and veterinary preparations were not included. There was a great deal of quackery, and all sorts of rubbish were sold to farmers.

On Clause 9 (Restriction of sale of medicines by unauthorised persons),

Lord Plumer moved an amendment specifying a series of processes, in addition to three named in the Bill, the use of which in the preparation of a substance could be used as a defence to a charge of unlawful sale. The processes he proposed to add were: "macerating, infusing, boiling, decocting, distilling, pressing, expressing."

Lord Horder said that the herbalists were asking that certain processes should be permissible which would inevitably result in so changing and confusing the ingredients as to make it impossible to state what finally were the constituents of the preparation. This was an effort to side-track one of the main principles of the Bill. Herbalists were in the same dilemma as the young lady, charged with driving her car to the common danger, who on being asked by a sympathetic magistrate why she did not make some sign to let another motorist know what she proposed to do, said: "There is no sign for what I was proposing to do." The herbalists were manoeuvring for a position which would free them from the onus of saying what was the stuff that the patient was swallowing.

Lord Addison said that the processes would cover practically the whole of the British Pharmacopoeia so far as it was produced from herbs and plants.

The Lord Chancellor, resisting the amendment, pointed out that additional protection was given to herbalists under subsection (5), and that the subsection to which the amendment referred was designed to cover only simple herbal remedies. The Government could not agree to the wide extension proposed.

The amendment was, by leave, withdrawn.

The Lord Chancellor moved an amendment, which was agreed to, providing that no prosecution for a contravention of the provisions of Clauses 8 and 9, relating to disclosure of composition of medicines and sale by unauthorised persons, should be instituted without the consent of the Attorney-General or Solicitor-General.

The Committee stage was concluded. The Bill was read the third time, and passed.

The following are among the questions and answers recently recorded in the House of Commons:—

BRITISH ARMY: RETIRED OFFICERS (RANK)

Colonel ARTHUR EVANS asked the Secretary of State for War whether, in view of the fact that his predecessor stated in the House over a year ago that the regulations governing the retention of temporary rank by Army officers on retirement from the Service would shortly be published, he can now give a definite date for their publication; and further, whether he will publish the suggested terms in the Official Report forthwith?

THE SECRETARY OF STATE FOR WAR (Captain MARGESSON): It has now been decided that an officer shall be allowed to retain on retirement the highest acting or temporary rank held by him in the present war, provided that the period for which the rank was held was not less than six months. Officers whose commissions are terminated as a result of wounds or sickness due to military service may retain the acting or temporary rank held immediately before their absence from duty on these grounds. An Army Order on this subject is now in course of issue.

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INCOME TAX (LIVESTOCK, VALUATION)

Mr. PRICE asked the Chancellor of the Exchequer whether he will consider, in assessments for Income Tax on farms, permitting valuations of livestock which do not take into consideration the fluctuations of the market, thereby securing that profits thus assessed will be real and not paper profits?

Sir K. WOOD: It is permissible for farmers in valuing their livestock for the purpose of computing their farming profits for assessment under Case I of Schedule D to adopt the normal commercial practice of valuing trading stock at cost or market value whichever is the lower. This practice ensures that tax is not assessed on any unrealised profit which might be shown by a comparison of the market value of the stock on hand with the cost of its production.

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RABBIT-KEEPING

Colonel CARVER asked the Minister of Agriculture whether he will give details of the scheme which his Department has drawn up whereby owners of rabbits can form a club and obtain a ration of 7 lb. of bran a quarter for each breeding doe?

Mr. HUDSON: A scheme for the encouragement of tame rabbit keeping on a domestic scale has been devised in consultation with my right hon. Friends the Secretary of State for Scotland and the Minister of Food, and with the Domestic Poultry Keepers' Council, with the object of utilising waste materials for the production of meat. Domestic rabbit keepers are defined as persons keeping not more than four breeding does for the production of flesh or flesh and fur, and the scheme will be operated through the medium of organised rabbit clubs. Rabbit keepers will be required to utilise the maximum quantities of waste greenstuffs from the garden and the allotment, the field and the hedgerow, and of household scraps. A supplementary allowance of bran will be provided for breeding does only at the rate of 7 lb. per doe per quarter. No rationed feeding-stuffs will be available for bucks or young fattening rabbits. Pet rabbits will, of course, be excluded from the scheme. In consideration of the supply of rationed feeding-stuffs for the breeding does, members of clubs participating in the scheme will be required to dispose of a prescribed proportion of the rabbit meat they produce to the common pool through the medium of a buyer selected by the club and approved by the appropriate Agricultural Department. Having regard to the importance of waste green-stuffs for feeding the rabbits, the chief scope for domestic rabbit clubs will be in rural and semi-rural areas. Urban clubs will not be accepted unless there is satisfactory evidence that members have access to sufficient quantities of greenstuffs to provide, with the allowance of bran for the breeding does, for their animals' full needs. The supervision and development of the scheme is being undertaken in England and Wales by the Domestic Poultry Keepers' Council, and in Scotland by the Scottish Gardens and Allotments Committee.

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GENERAL MEDICAL COUNCIL (APPEALS)

Mr. GROVES asked the Lord President of the Council whether he is aware that dentists accused of infamous conduct in a professional respect have the charges heard by the Dental Board, but also by the General Medical Council, before whom there is another hearing, and that there is a final appeal to the courts; and why the right of appeal is not permitted to doctors except on a point of law?

Sir J. ANDERSON: I am aware that the provisions of the Dentists' Act, 1921, differ from those governing the medical profession, but that is as Parliament has thought fit to enact.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Aug. 15th.—Meeting of the Royal Counties' Division, N.V.M.A., at Reading University Farm, Sonning, 2.45 p.m.

Aug. 20th.—N.A.R.P.A.C. Rural Areas Committee, 36, Gordon Square, 11.30 a,m.

Aug. 21st.—Special Meeting of Council, N.V.M.A., Connaught Rooms, Kingsway, W.C.2, at 2.30 p.m.

Aug. 21st.—Special Meeting of N.V.M.A. Finance and General Purposes Committee, 36, Gordon Square, 11.30 a.m.

Sept. 12th.—**59th Annual General Meeting of the National Veterinary Medical Association of Great Britain and Ireland**, in the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, at 2.30 p.m.

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A Message from the American Veterinary Medical Association

In these days, especially, words of encouragement and fellowship from our confrères overseas are a source of strength to us all. Our readers will welcome the reproduction of the following message embodied in a letter, recently received by one of the members of the N.V.M.A., from Mr. J. G. Hardenburgh, Executive Secretary of the American Veterinary Medical Association:—

> "We take this opportunity of extending the very best wishes of the officers and members of the A.V.M.A. to you and other British colleagues. Our interests and sympathies are identical in the present conflict."

Benevolence

FURTHER DONATIONS RECEIVED IN RESPONSE TO THE APPEAL MADE BY THE OFFICERS OF THE N.V.M.A.

	£	s.	d.
Already acknowledged	962	11	6
Abbott, S. G.	0	10	6
Beale, Miss J. H. M.	0	5	0
Collinson, W.	1	1	0
Green, Geo.	0	10	6
Howse, A. C.	0	5	0
Liverpool University Veterinary Society ...	1	1	0
MacKenzie, F. McDonnell	0	10	0
Dumfries and Galloway Division (second contribution)	23	12	6
Mid-West Division (second contribution): Mr. and Mrs. V. E. Perry	1	11	6
North Wales Division (second contribution):			
Balls, D. F. £0 4 0			
Bowen, J. N. 1 0 0			
Cartwright, C. W. ... 1 0 0			
Dwerryhouse, W. L. ... 1 0 0			
Edwards, E. P. 1 0 0			
Forgrave, W. 1 0 0			
Harbour, H. E. 0 10 0			
Hughes, H. V. 1 0 0			
Hughes, W. 1 0 0			
Jones, H. Llewelyn ... 1 0 0			
Lewis, R. L. 1 1 0			
Mills, J. E. 1 0 0			
Roberts, G. J. 0 10 0			
Sutherland, A. 1 0 0			
Williams, J. L. 1 0 0			
Williams, R. Wynne ... 1 0 0			
	14	5	0
South-Eastern Division	31	3	0
Sussex Division and Members of Division ...	20	7	0
	£1,057	13	6

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PERSONAL

Notification is made in *The London Gazette* (July 11th, 1941) that Major H. W. Brekke, late R.A.V.C. T.A., now serving as Captain, R.A., has been awarded the Territorial Efficiency Decoration.

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R.C.V.S. OBITUARY

THE LATE MR. J. R. BAXTER, M.R.C.V.S.

Mr. John Richmond Baxter, M.R.C.V.S., whose death we recorded with much regret in our issue of August 2nd, was a valued member of the Mid-West and Royal Counties Veterinary Medical Associations. In a tribute, the *Wilts and Gloucestershire Standard* of August 2nd says of him: "Mr. Baxter spent his early years in London. The following 40 years were spent in Lechlade, where he succeeded Mr. Clay. His professional work brought him to the fore over a very extensive area. His genial disposition was a great asset to him. He made a great number of friendships and retained them to the end. His friends will miss him sadly. He further took a warm interest in parochial matters. For several years he was vice-chairman of the Parish Council; he assisted in forming the Nursing Association in 1905, and was a regular member of the committee since 1907. For many years he supported the swimming club and acted as its hon. treasurer. These were but a few of his activities. He came to live at Downington House, Lechlade, in 1902.

"The esteem in which Mr. Baxter was held on all sides was shown by the presence of so many at the early morning service at the Church on Saturday last.

"Much sympathy is felt and expressed with Mrs. Baxter and her only son (Mr. A. J. Baxter, M.R.C.V.S.) and daughter in their bereavement."

There was a large company at the funeral service, on July 26th, at the Lechlade Parish Church, when the following members of the profession, in addition to Mr. A. J. Baxter, were present: Messrs. T. A. R. Filgate, Faringdon (representing the Royal Counties Veterinary Medical Association), J. R. Hewer and T. J. Reynolds (representing the Mid-West Veterinary Medical Association).

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CONFERENCE OF VETERINARY STUDENTS

A conference of veterinary students—the first of its kind to be held—took place at Derby Hall, the Liverpool University Hall of Residence for men, on July 29th and 30th. The conference, which was attended by representatives from each college, with the exception of Dublin, whose representatives were unfortunately unable to obtain travel permits, discussed various aspects of the following subjects: private practice, State service and panel system, syllabus and examinations, and clinical studies. During the four sessions of the conference, of which Mr. H. A. Clay, of the Liverpool College, was President, a large number of resolutions were adopted for submission to the Royal College of Veterinary Surgeons.

Fuller reference to these proceedings will be made in our columns in due course. In the meantime it may be noted further that the conference is to be held annually, and at each of the colleges in turn, in the following order: Liverpool, Glasgow, London and Edinburgh. Its object is to discuss all matters of interest to veterinary students and the profession.

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ANIMAL DISEASES RESEARCH ASSOCIATION

At the Annual General Meeting of the Animal Diseases Research Association held at Moredun Institute on July 23rd, 1941, the Director, Dr. J. Russell Greig, in the course of making his annual report, stated:—

"The last 20 years have represented a period of remarkable progress in our knowledge of animal disease. Twenty years ago we were almost entirely ignorant of the cause (and in some instances even of the nature) of a large number of the specific diseases of major economic importance. Since then, with few exceptions, the cause of practically all the specific diseases of major economic importance in Britain has been elucidated and means for their specific prevention have either been evolved or are in process of being evolved. The more important of the diseases which I have in mind are braxy, lamb dysentery, milk fever, lambing sickness, lactation tetany, louping-ill, mineral deficiency pine, pulpy kidney disease, enterotoxaemia of sheep, tick-borne fever, swayback and scrapie—a formidable list—and it is with very considerable satisfaction that we realise that this Institute has been intimately concerned in the elucidation of the majority of these disease problems.

"There is, however, one disease, the nature of which, despite prolonged, extensive and intensive research, has remained unknown. I refer to grass sickness in horses. I should prefer at the present juncture to say nothing more than this, but, recently, some new light has been shed on this problem and, as a result, at least my ideas of the nature of the disease are, at last, straightening out. These ideas, however, are still at such a stage of their development that I cannot say more than that a promising line of research appears to have been found. I say that with, I hope, all due sense of responsibility and with the concurrence of the Scottish Board of Research in Veterinary Science. I would conclude this statement with the assurance that the work on grass sickness will continue to be prosecuted with every means in our power."

COLONIAL POLICY IN WAR-TIME

The dispatch which Lord Moyne, Secretary of State for the Colonies, sent to Colonial Governments on June 5th regarding Colonial policy in war-time was issued recently as a White Paper (Cmd. 6299, price 2d.).

Lord Moyne, giving the main points of the dispatch in the House of Lords on July 9th, said that it was important for the Colonies to plan ahead for the return of normal conditions, and announced the setting up of the Hailey Committee for Colonial post-war reconstruction.

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MINISTRY OF AGRICULTURE NEWS SERVICE

Swill for Pigs and Poultry

Local Authorities Instal Plants to Treat Waste.—Many local authorities are now installing plants for treating urban kitchen waste. This treatment reduces the moisture content, makes the waste easier to handle and transport and more suitable as a feeding stuff, and at the same time sterilises it, thus saving the farmer the trouble and expense of boiling. The first plant was installed at Tottenham many months ago, and the concentrated swill has been eagerly sought after by pig and poultry keepers. East Ham and Nottingham have put in similar plants: Newcastle, Wolverhampton, Birkenhead, Sheffield, Brighton, Preston and Woolwich have begun to make concentrated swill in the last few weeks; and plants will soon be operating in Leeds, Middlesbrough, Luton, Bristol, Oxford, Norwich, Southend, Plymouth and Derby.

Pig and poultry keepers in these areas would be well advised to take supplies of this material, since its valuable feeding qualities have been definitely established. They are, therefore, urged to make early application to the local authorities, from whom particulars of cost can be obtained.

Perils of the Road

Dangers of Straying Stock in Black-out Hours.—Night-driving during the war is not a pleasant occupation, as most farmers know. Any unexpected obstructions make it exceedingly perilous, and there have been a number of accidents through farmers' cattle and other livestock straying on the roads after nightfall. In view of the practical difficulties, such as supplies of wire and posts, it is not at present proposed to require farmers to fence all open land where stock may be at night, although this proposal has been made. But stock owners are most earnestly asked to do everything in their power to keep their animals off roads during hours of darkness, even if it means grazing them in one place by day and another by night. As well as the danger to people on the roads, there is often loss caused to the owner of the stock through injury for which there is no compensation. In fact, if the police find animals straying their owner is liable to prosecution.

Storing Brewers' Grains: Warning to Those Using Silos.—In a recent News Service the Ministry advised the storage of wet brewers' grains in pits or clamps, but added that they might be preserved in silos. But brewers' grains pack very tightly indeed and maintain a constant high pressure. Cases are on record of silos having burst under this strain. Those storing these grains, therefore, are advised not to put them in silos without consulting the makers. There are silos on the market specially strengthened for this purpose.

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QUARANTINE STATION FOR SCOTLAND

The Ministry of Agriculture Veterinary Service have just taken a short lease of the steading buildings at the farm of Netherton, near Anniesland, Glasgow, to serve as a quarantine station for cattle and sheep exports. "Those exporters who have for long been so keen on getting direct facilities from Scotland, especially since the closing down of the London station, will be delighted by the news," says *The North British Agriculturist*. "Netherton, which is on the Garscube estate, is tenanted by 77-year-old William Crawford, who will continue to reside in the farmhouse and act as overseer for the Ministry.

"Formerly a 75-acre holding, only three acres are now attached to the farm as a result of housing incursions, but at a pinch there is accommodation in the buildings for 50 head of cattle and 30 sheep. The farm is very conveniently situated for the purpose, having its own roadway off Western Avenue, and being bounded on the north by the L.N.E. Railway to Helensburgh and Milngavie and on the south by the Forth and Clyde canal.

"It is expected that the station will be in actual operation very shortly."

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POULTRY RATIONING CRITICISED

Criticism of war-time poultry rationing is made in the annual report of the National Poultry Council presented at the recently held National Poultry Parliament.

"The great fall in imports of feeding-stuffs led to the necessity of imposing control upon their distribution and the institution of a policy of priority under which first claim was given, with general approval, to the needs of milk production. Unfortunately, owing to advice based upon a narrow scientific conception of dietary values, egg production was given only a very low place in this scale of priorities, with the result that food supplies allotted to poultry have sufficed for the maintenance of only a mere fraction of our pre-war industry."

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"The Government has found it possible to increase the allocation of certain raw materials to dog food manufacturers." This information was given in a letter from Major G. Lloyd George to Sir Robert Gower.

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Dr. C. H. Best, who was a co-worker with the late Sir Frederick Banting in the research work leading to the discovery of insulin, has been appointed to succeed him as head of the Banting Institute in Toronto, which was founded for the continuance of similar investigations.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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CONTROL OF BOVINE MASTITIS

To the Editor of the Veterinary Record

Sir,—Your issue of February, 1941, containing an account of the discussion on "Contagious Streptococcal Mastitis of Cattle" at the Scottish Metropolitan Division, N.V.M.A., on November 9th, 1940, reached me on April 18th. It is satisfactory to see that the subject of controlling bovine mastitis is now engaging the active interest of the profession and that an attempt is being made to formulate a workable scheme intended to reduce the incidence of the disease and so conserve food during the present war.

There are a number of points in Dr. Watts' address and in the discussion thereon to which I would like to refer. In the first place, there is frequent reference to the work which was carried out by myself and my colleagues, A. W. Stableforth and S. J. Edwards, at the Research Institute of the Royal Veterinary College, London, from 1927 to 1939. These references are sometimes rather misleading so perhaps I may be permitted to comment.

I know of no satisfactory reason for doubting the view that *Str. agalactiae* is an obligatory parasite of low virulence or that it is the cow, and not her surroundings, that is to be regarded as the real danger. Dr. Watts, however, ascribes to me opinions which I am not aware of having expressed. I myself have never in fact sought for the organism outside the body and would think the attempt to do so scarcely worth while. Whether the organism lives outside the udder a short or a long time is probably of no great importance.

The statements made at Edinburgh may also give the impression that we in Great Britain were the only workers to affirm that mastitis can be controlled or eradicated by segregation of infected animals following cultural tests of the milk of individual animals. This is far from being the case. Workers in other countries, *e.g.*, Steck (Switzerland), Seelemann (Germany), Little (U.S.A.), have also suggested that the disease should be dealt with in this way. Thus, at least four groups of workers, acting quite independently, have brought evidence to show that, at the lowest estimate, much benefit is to be expected by such means. I believe, however, that we in Britain may claim credit for having demonstrated for the first time that starting from an infected herd a group of cows *can* be built up and maintained free from *Str. agalactiae* for a prolonged period. The extensive work of Steck may be mentioned as indicating that in practice the disease can be controlled and sometimes eradicated on a fairly wide scale by such means. Indeed, both in Germany and in Switzerland (Bern) voluntary control schemes have been put into operation, it seems with success. It should be pointed out that our results, from which we drew certain favourable conclusions, were based on actual happenings in a small number of herds. We may have been unfortunate in a sense in that our choice of herds was not representative but the results in some of them were striking and, looking back, I believe we could have reached no other conclusions. At no time, however, did we fail to emphasise that more experience was needed. It is gathered that this more recent experience—which incidentally coincides with my own later observations—hardly supports the distinctly favourable impressions we first formed.

In my last article (*J. Comp. Path. and Therap.*, 1939, Vol. 52, p. 266) I have tried, with particular reference to the valuable work of Steck, to ventilate the principles which should guide us in future dealings with this disease. I have also ventured to suggest some of the directions at which future research should aim. We want to know, for instance, more about the possibilities of infection in first-calving animals and it is good to see some progress has been made in this direction by Dr. Cunningham. His results incidentally show how variable in this respect are the happenings from herd to herd, *e.g.*, in some many heifers are found to be infected, in others none at all, and this in itself may be a clue as to why attempts at eradication sometimes succeed and sometimes fail. There is also the problem of host susceptibility, the importance of which is recognised.

Practicable efforts to control mastitis—it is certainly better for the present to avoid the word "eradication"—may be resolved into a short-term policy and a long-term one. The short-term policy which has now been proposed assuredly has merit in that it is an attempt to do something, and it would no doubt bring some improvement, as would be so with a serious attempt by any method. I must, however, acquiesce in the notes of caution voiced by Dr. W. S. Gordon and Dr. Cunningham. The necessity for obtaining as quickly as possible some trustworthy information as to the value and limitations of the diagnostic methods proposed, using for comparison a good cultural test, would appear to be highly desirable—and may already have been done. Actually I am not in the least impressed with the value of clinical examination, by which presumably is meant manipulation of the empty udder, and with Dr. Cunningham I would not regard the "strip-cup" as a very scientific or accurate method of procedure. Now, my colleagues and I have often considered the practicability of applying laboratory methods on a broad scale to the examination of milk from individual cows and one of our conclusions was that the difficulties can be and often are unduly magnified. For one thing, it is known that the examination of mixed milk samples, taken from the four quarters, is of considerable value for a preliminary sorting-out of animals, especially in large herds. The labour is thus greatly reduced, as only two or three plates are needed for each cow, while at the same time I recall that in the Division of Preventive Medicine at the Royal Veterinary College, London, it was possible without excessive staff to get through the examination of quarter milk samples from at least 100 cows each working week. Also, a single laboratory examination will often remove the necessity for further testing of a cow, and there must after all be many owners who would prefer a final diagnosis as quickly as possible; this I submit can oftentimes be obtained only by approach to a milk-testing laboratory. Again, when one thinks of the vast amount of plating which for years has been practised up and down the country in connection with the bacterial count of milk, one should not object to a similar method being practised for what some may think is a more worthy purpose. Incidentally, it is noted that even in the proposed scheme a considerable amount of laboratory supervision is already contemplated. In writing the above I merely wish to state that large-scale laboratory testing is not so difficult as may be thought, but I agree, of course, that now is scarcely the time to inaugurate on a national scale a proper system of milk-testing.

Now I come to what may be called the long-term policy for controlling mastitis, which for all our present preoccupations must be considered the more fruitful. We can approach such a policy in a calmer frame of mind and feel our way in an attempt to obtain some lasting benefits. In this connection, it is particularly gratifying to read the remarks of Sir A. Olver which I consider go right to the point and should be read again for their wisdom and for our future guidance in Preventive Medicine.

> "Mr. Gofton had remarked that laboratory facilities could not be provided at present all over the country. That should not be the case in a community like ours. This country ought to be provided with all the laboratory assistance and organisation required for investigating problems of animal health and for assisting the practitioner to deal with them as they arose. Until they got those problems dealt with systematically by an organisation with the necessary funds, facilities and powers, the profession would not have an opportunity of showing what it really could do."

Much was said at the Edinburgh meeting, and rightly, of the part the practitioner should play in mastitis control. In my view the practitioner's rôle should be mainly, though not entirely, an advisory one. He should act as a necessary link between the "essential laboratory services" (in the words of Mr. Nairn) and the herd owner. This does not in the least imply any inferiority. The practitioner has knowledge which the owner has not and he would be fortified in his usefulness by the information he had received from the laboratory. It will be his rôle, for instance, to select cows which from their history are certainly infected and which therefore require no further examination, to advise as to disposal of infected animals (taking into account their age, degree of infection, presence of other diseases, etc.), the care of those which are clean, hygienic measures in general, and finally it should be his task to carry out treatment of selected cases by udder infusions.

Yours faithfully,

F. C. Minett.

Imperial Veterinary Research Institute,
Mukteswar-Kumaun.

May 10th, 1941.

"A PRACTITIONER'S COMPLAINT"

The "Veterinary Unit" as Part of a Long-term Policy

To the Editor of the Veterinary Record

Sir,—It seems a pity that once again symptoms are appearing that Bureaucracy and the Individual are losing their common ideal: "Service to the community"; each in turn expecting that the reward will be reasonable security.

On the face of things, Mr. Shipley has certainly a reasonable case for the consideration of a fair-minded community in the exceptional circumstances. I was, however, very pleased to read Mr. Edwards' letter suggesting the proper procedure now to be followed to enable some of the present difficulties to be overcome in a democratic manner. I am sure that the Ministry will find it easier to answer criticism and perhaps right matters if the consultative committee of the "National" sift the facts impartially first.

Perhaps I may be allowed to take up a good deal of space in an attempt to put up for critical comment some thoughts which have exercised my mind for some time.

I am satisfied that many members of the profession are individually dissatisfied with themselves, realising that the available knowledge of diseases of animals is not being, nor can be, in our present state of organisation, utilised to the full. This applies to large and small animals.

It is a healthy sign that the desire for fuller service is evident from all sections of the profession. Various schemes are tentatively suggested from time to time which go some way toward remedying the more apparent and urgent problems which confront us.

Through all these cross currents of thought, one feels that some sort of State Veterinary Service is the ultimate solution hoped for.

I think the time is opportune for open discussion on the lines which the long-term policy of the profession should follow.

What could a State Service be?

(*a*) A useful and living force in the life of the country.

(*b*) A soul-destroying machine.

No one would wish to be part of the latter, and I feel now is the time to get our thinking done—before, in the face of complacency and satisfaction with tinkering, we find ourselves as a profession nicely shut in little compartments, directed in our efforts either by a Government department, charitable organisations, or independent research units, with the colleges and the examining body in a very awkward position.

Without adding anything to the criticism of any present systems of tackling veterinary problems I would like to put forward some points for consideration and criticism.

I will take as an example what could be done in an area with a city such as Glasgow as a centre.

Geographically placed in the centre of a good agricultural area and well supplied by its veterinary personnel, by voluntary co-operative effort on the part of each, a unit could be formed, comprising a first-class hospital, with laboratory facilities.

The individual veterinary surgeons would still retain their practices in their own areas with no interference as to their methods of running them.

By a close co-ordination with the Divisional Officer of the Ministry, who should have wider powers of discretion to work regionally (within the framework of the Diseases of Animals Acts, as may be deemed necessary from time to time), these units could, after discussion of local circumstances, operate completely and with fairness to everyone. A greater interest in the work of the Ministry would naturally arise and the veterinary officer of the Ministry would be in closer touch with veterinary problems as a whole; I am satisfied that goodwill would be established on all sides. The element of clean competition between areas would be all to the good.

A channel would be open to pathologists and other special workers to take part in the work of these units. Much of the diagnostic work which could be undertaken by these specialists would in itself become in part an economic factor, at the same time enabling the practitioner to reduce the present cost of such work. In a very short time the laboratory side would be self-supporting.

A portion of the collective overhead expenses of several practices would almost certainly meet the expenses of running such a unit, and the facilities which could be provided—such as operating equipment—and those for the more complete investigation of individual cases or general diseases, collection of statistics, etc., should be obvious, and an advance in knowledge within a shorter period made more certain.

There would be little or no disturbance of existing practices as there would be no need to do other than scrap existing individual kennel accommodation and retain a small clinic in our present areas.

In-patients would be sent to hospital and treated by the individual, but instead of having to rely (as must be the case in many practices, especially where the small-animal part of the practice is a minor one) on half-trained staff which is all we can afford, the services of an experienced nursing staff would be available. The public and the animal are entitled to a fairly high degree of skill and consideration. Fixed fees (based on cost) would be charged by the hospital. The veterinary surgeon could charge the client his normal fees. Arrangements for utilising any surplus could be decided on by the local unit committees either to add to equipment or give dividend returns.

Other advantages of such a scheme of collective action would be the opportunity of arranging a scheme of superannuation.

Students could see all sides of practice and decide on their particular bent; then the opportunity would be open to them to come on as an assistant with the unit and ultimately, by easy and progressive stages, acquire an interest in any one of the practices in the area. It would be in the best interests of all to have the section which most interested the young graduate open to him and with security. There would be less loss of knowledge than under our present system. At present a student who, having seen practice with an experienced practitioner, leaves that branch for economic reasons, is never in the position to pass on the practical knowledge or add to it.

That, roughly, is the general principle on which a Co-operative Veterinary Service could be built up.

The question of finance for the initial start of such units presents what appears to be the greatest obstacle, but it is one which could be easily surmounted in several ways.

From banking circles I have the assurance that such hospital buildings would be good security for an advance from the banks. The Ministry and other interested bodies could be partly responsible for the establishment of the laboratory facilities. The Ministry should, in fact, have a very definite interest in such an undertaking on what might be termed a partnership basis, but never as a controlling factor. The government of the profession must be by its members. I am certain that a liaison such as this, far from weakening the position of a Government department or its officers, would, in fact, add to the efficiency of the service and enhance the respect in which it is held.

The question of the animals of the poor is one which merits attention. By the establishment of such units as these, provision could be made for their treatment. If the animal welfare societies really have the good of the animals at heart they should be only too willing to co-operate. In any case our own concerted action in this matter would be an effective answer to the policy of certain humane societies.

I do not suggest that the present time is the most opportune for putting such a system into complete operation, but I do think that the time is ripe for the profession to discuss the possibility of erecting a framework of policy on which future generations can build a system which would meet any economic circumstances which will arise.

I also appreciate that it will require a good deal of give and take on the part of everyone to get any scheme going which embraces the whole profession.

Yours faithfully,
ALEX. THOMSON.

220, Albert Drive,
Pollokshields,
Glasgow, S.1.

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TO THE EDITOR OF THE VETERINARY RECORD

Sir,—The sympathy of the profession must go out to Mr. Shipley under his present circumstances, but one wonders if he is so very much worse off than the Panel B man is to-day. At least Mr. Shipley can console himself with the thought that his troubles are due to no fault of his own, whereas the Panel B man can only stand and watch his practice being gradually but surely filched away by Government legislation. Mr. Muir's letters and those of his critics have been very interesting and show various ideas as to how a veterinary practice should be conducted to-day. Several of those critics, like the Survey Committee, seem to run away with the idea that the milk cow is the one and only animal on the farm. I hold that she is not even the most important on the vast majority of farms in England. If I was to hazard a guess as to the disease causing the greatest loss to the country I would say parasitic infections of young animals. For the profession to concentrate on those few diseases affecting the milk cow only, to the exclusion of many others, quite as serious, is a ruinous policy. Of course this same ruinous policy has been going on for several years now and has already driven much genuine veterinary work into the hands of quacks, wholesale druggists and cattle medicine vendors. Farmers tell of their breakfast tables being littered with Ministry leaflets, advertisements from medicine vendors telling them how to treat their animals, and lavishly illustrated communications from veterinary instrument makers explaining their use. They know all about chenopodium, cupri. sulph. and nicotine; one recently informed me that phenothiazine was quite useful in sheep.

Some of Mr. Muir's critics seem to take exception to his using the word subsidy. Can any of those critics explain the great rise in the price of milk since an attempt was first made to clean up dairies? The cry has been "drink more milk," but to double the price does not seem the right way to encourage it. At one time thousands of gallons were sold at the farm as low as 3½d. per gallon. To-day ordinary commercial milk is retailed at 4½d. per pint. Surely 1,000 per cent. rise between the producer and the consumer will take some explaining if the public should get inquisitive. Some people have been asking, are the findings of the Survey Committee a Public Health move? If so, then make the public pay for it, but if it is a move to improve the health of the cow and make her more remunerative then it will take much thought and management as conditions vary so much in different parts of the country and even on adjoining farms. This neglect of general practice for the milk cow is showing itself in the attitude of insurance companies. Many of them do not now want their infoal mares examining, and only last week I have seen two letters accompanying claim forms telling the insured that if a veterinary surgeon has not seen the animal the signature of a neighbour will be enough. One was for a 2-year-old colt killed by lightning that I had valued at £48. They did not even require a death certificate. Not only has the profession been concentrating too much on the milk cow at the expense of the other animals, but our veterinary colleges have been doing likewise—as many practitioners can corroborate who have had to employ recent graduates.

Yours faithfully,
WM. A. CAMPBELL.

Boroughbridge,
Yorks.
August 2nd, 1941.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th July, 1941	8	9	2	72	—	7	3	29	16
Corresponding period in ...									
1940	15	18	—	—	1	2	2	221	167
1939	29	30	—	—	—	—	4	149	138
1938	30	33	—	—	—	—	1	36	32
Total 1st January to 15th July 1941	282	325	257	26,511	10	39	137	824	390
Corresponding period in									
1940	296	336	19	2,853	15	29	117	2,332	1,573
1939	481	521	44	5,652	31	70	156	1,200	832
1938	511	566	155	19,940	42	70	104	336	248

NOTE.—The figures for the current year are approximate only.

§Excluding outbreaks in Army Horses.